“How the @#$%&! do DOL hacks work!!”

So you’ve just been handed a code by a sagely gent, and it looks like this:

Pause Passive Meter Gain (3 Man Cell):
04055354 38800000

And you’ve been asked to port it to main.dol. That’s…sorta tricky in its current form. This code’s meant to work within Dolphin…so, let’s turn it into something that you can bake right into the dol.

Breaking it down

Author’s note: I didn’t want to name names, but if you’re working with ***gamemasterplc*** on this project, any codes he gives you will reference memory offsets and overwrite 4 bytes. If you don’t know what this means, it’s OK: read on. You will soon.

So let’s take another look at this code. It’s actually super easy to read. Check this out.

04055354 38800000

The red area says “swap the next 4 bytes”.
This will be 02 for a two-byte code, and 00 for a 1-byte code.

The yellow area is the offset in memory. It’s where it looks while the game is running. What the system ACTUALLY provides the memory is slightly different – I’ll get to that in a second.

The blue area is the bytes you’re going to be swapping. As I mentioned earlier, these are 4 bytes.
“But author, there are EIGHT letters/numbers!!”
Yeah dum-dum a single byte is a two-character hexadecimal string that can range from 00 to FF. A four-byte string is eight characters – OK you’ll see what I mean later. Trust me, OK

Let's get right to the action

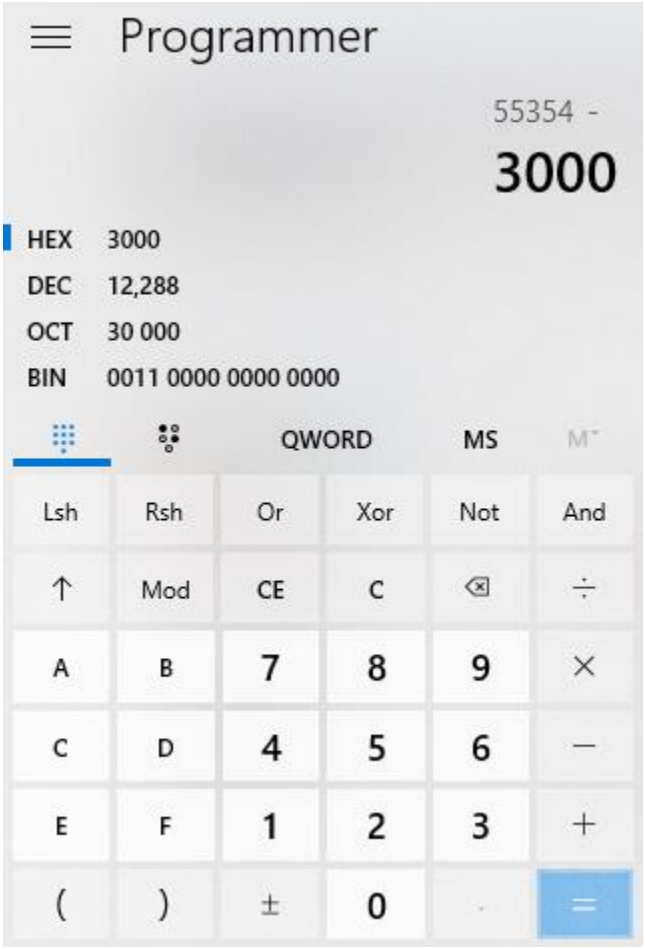
So, that red code? The first byte? Forget about it, you know what it means already.
Let's take a look at the next 3 bytes.

055354

So, for GNT 4, you'll want to subtract this address by 3000 using a programmer's calculator.
"But I don't own one of those calculators!! Where do I buy one!!"
Hold up. You already have one. Open up your PC's calculator app. I use Windows 10, so you'll see the following in the following screens.

Windows 7/8
http://www.thewindowsclub.com/use-windows-calculator-convert-decimal-to-binary
(Follow this, but select "Hex" instead on the left instead of "Bin")
Windows 10
http://www.thewindowsclub.com/use-new-windows-10-calculator
(Follow *Programmer* instructions, click on "HEX" for hex output. Or don't, it displays anyway)
Mac OS X
http://osxdaily.com/2015/06/14/access-scientific-programmer-calculator-mac-os-x/
Linux
Dude if you installed a Linux distro and don't know how to access the Programmer setting on the calculator how can you even call yourself a power user

[also, a little note: if the 0 doesn't show up when you input it at the beginning, don't worry. Bear with me]



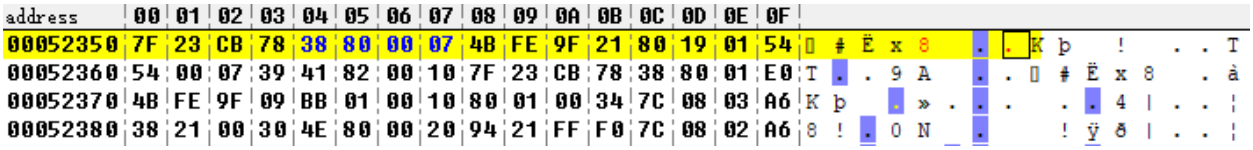
Go on, hit that = button.

Nice! So you're going to want to go to 0x52354 in main.dol.

[*Author's note:* When you're working with addresses and offsets, using an "x" denotes repeat numbers. It's the numbers to the right of the x that are important, anyway)

Here comes the fun part

Open that main.dol up in your hex editor of choice, and search for that offset (or address)



address	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00052350	7F	23	CB	78	38	80	00	07	4B	FE	9F	21	80	19	01	54
00052360	54	00	07	39	41	82	00	10	7F	23	CB	78	38	80	01	E0
00052370	4B	FE	9F	09	BB	01	00	10	80	01	00	34	7C	08	03	A6
00052380	38	21	00	30	4E	80	00	20	94	21	FF	F0	7C	08	02	A6

Apologies if this is a little hard to see: I've highlighted 38 80 00 07. You can just write in the part of the code from earlier: 38 80 00 00…OK, in this scenario, you're only changing 07 to 00, but sometimes things are a little more complex.

That's it. That's literally it. Now you too can inject code into a DOL.

Extra tips from the Game Master himself

- If your code doesn't have a third digit of 0 or 1 [so 2 or higher] you shouldn't try porting to dol mod
    - This references memory that changes at runtime, like the savegame.
      A few codes beginning with 2 are initialized at compile time, but need different add offset.